Program Executive Office
C4I & Space

PEO C4I Integrated Network Centric Warfare Roadmap

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Advanced Planning
PEO C4I and Space
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Statement A: Approved for public release; distribution is unlimited

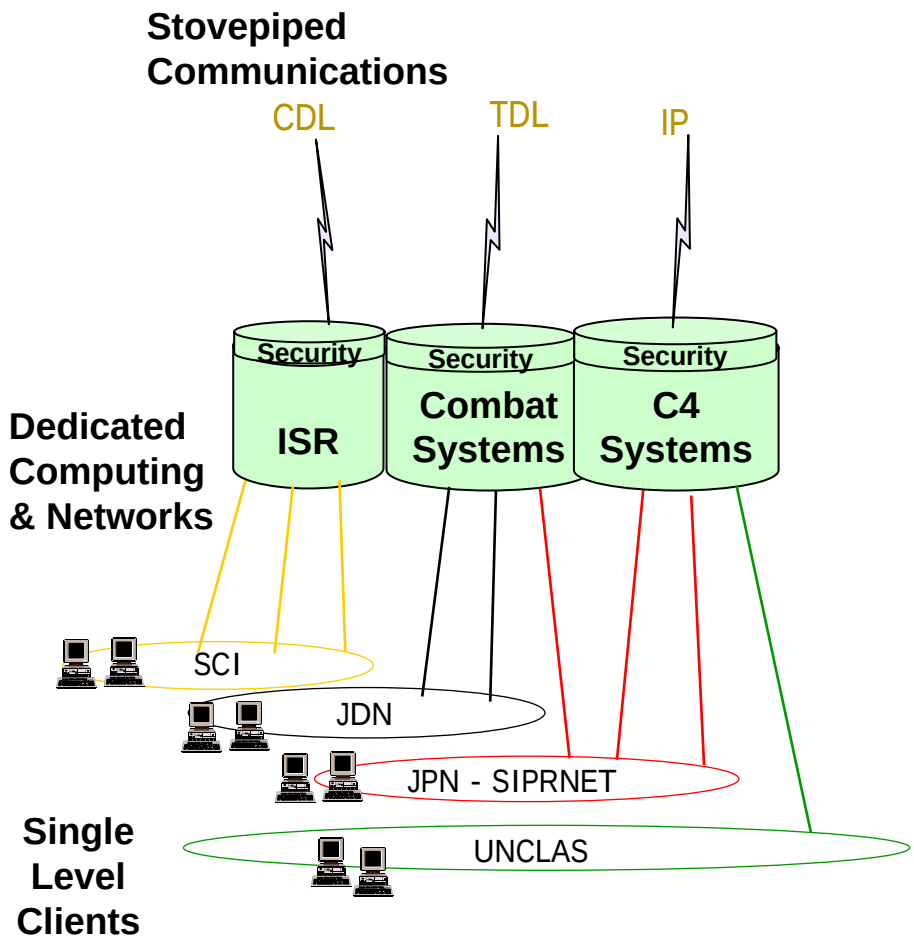
Integrated Roadmap Vision

- Allow us to provide *capabilities-based* integrated products for the fleet
- Serve as a mechanism to synchronize delivery, ensuring the planning and programming timelines of systems and infrastructure are logically aligned
- Reveal gaps and overlaps in capability that we must address in our current systems

Current C4I Environment

IT21 Today

- Bandwidth Constrained
- Stovepiped Systems
- Inefficient Use of Resources
- Little Redundancy
- Multiple Enclave and Application Specific Networks
- Isolated Coalition Enclaves
- Stovepipe Raw Data Streams to Operator
- Inconsistent Data Quality Across Information, Sensor and Engagement Networks

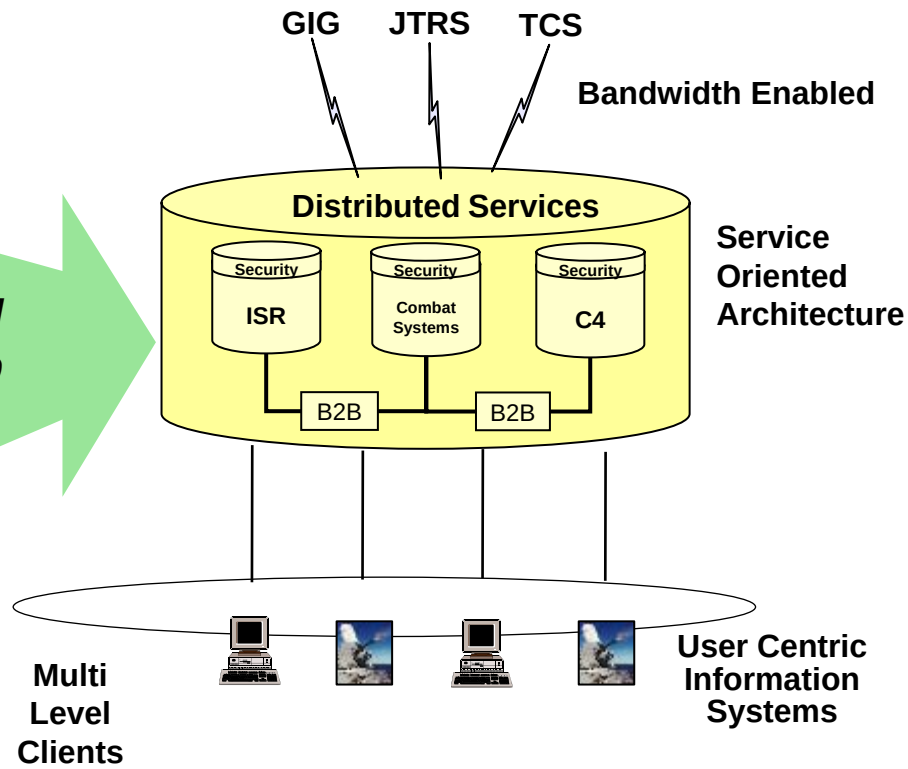


The Future Vision: NCW

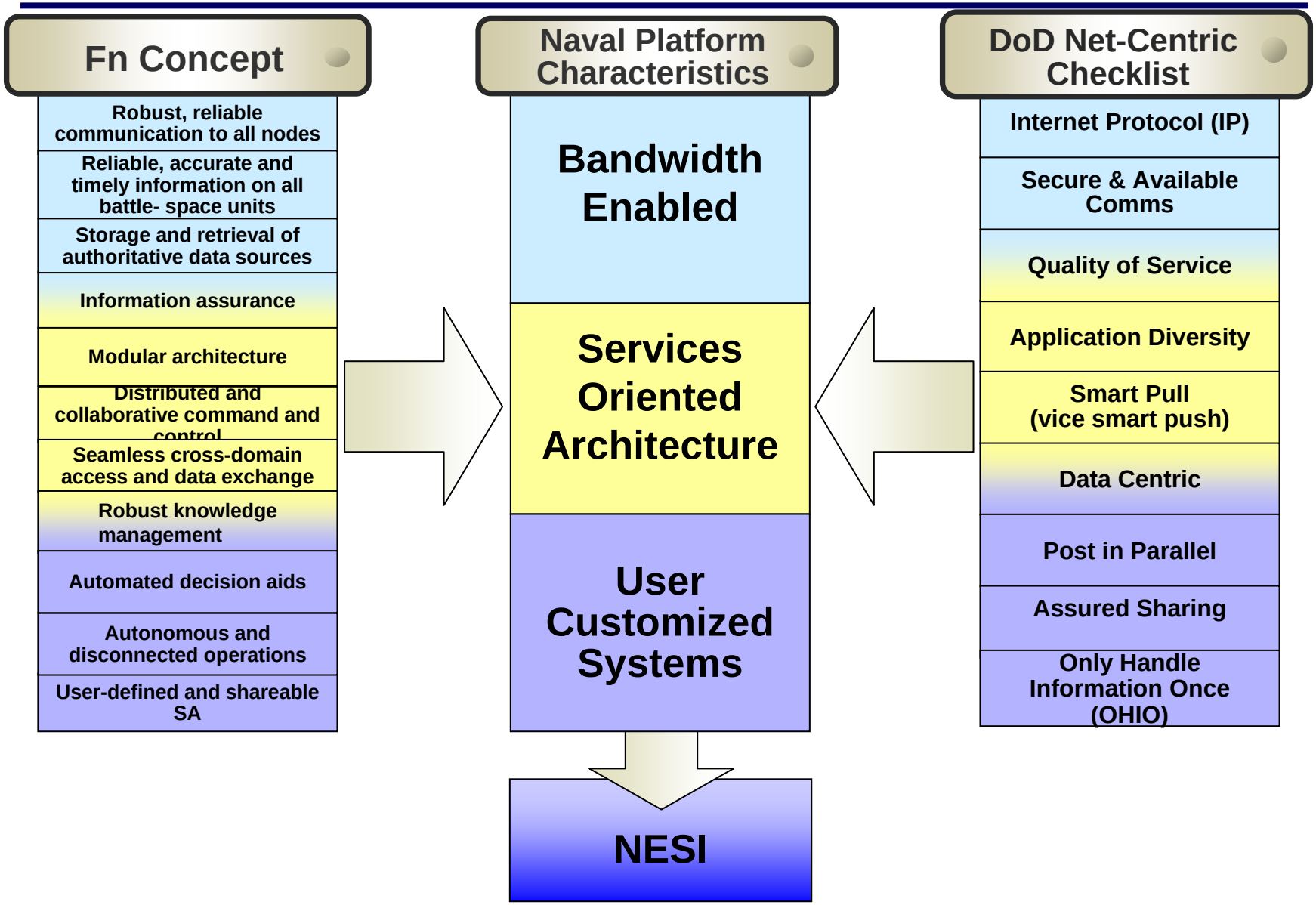
NCW Objectives

- Remove Bandwidth as a Capability Limit
- Multi-path Transport & Redundant Paths
- Capability on Demand
- Distributed Operations
- Customized Applications
- Multi-User Access
- Customized Delivery
- Assured Sharing
- Information Provided to Operator is Relevant, Timely, Accurate, and Usable

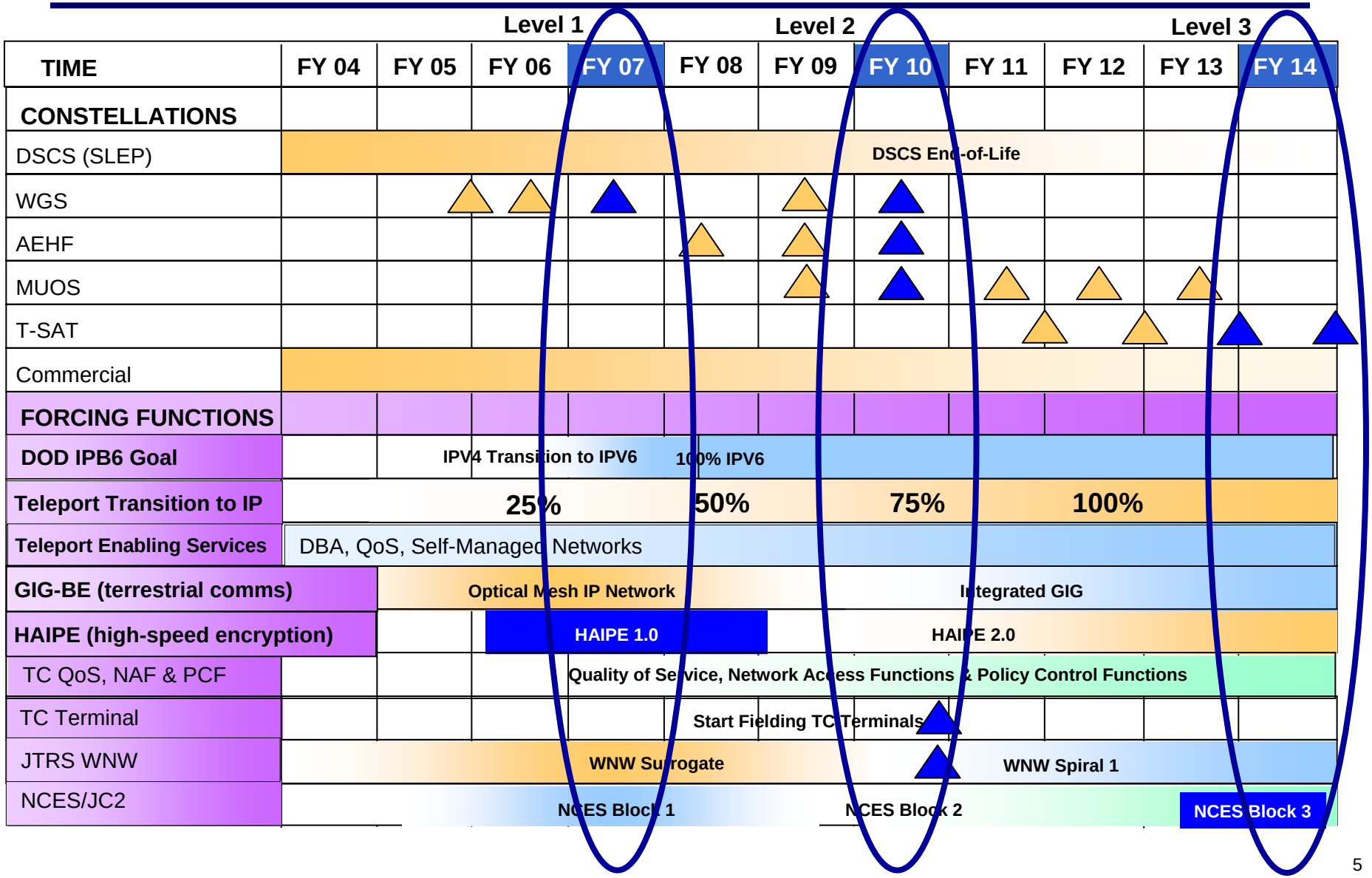
Integrated Roadmap



Naval Platform NCW Characteristics

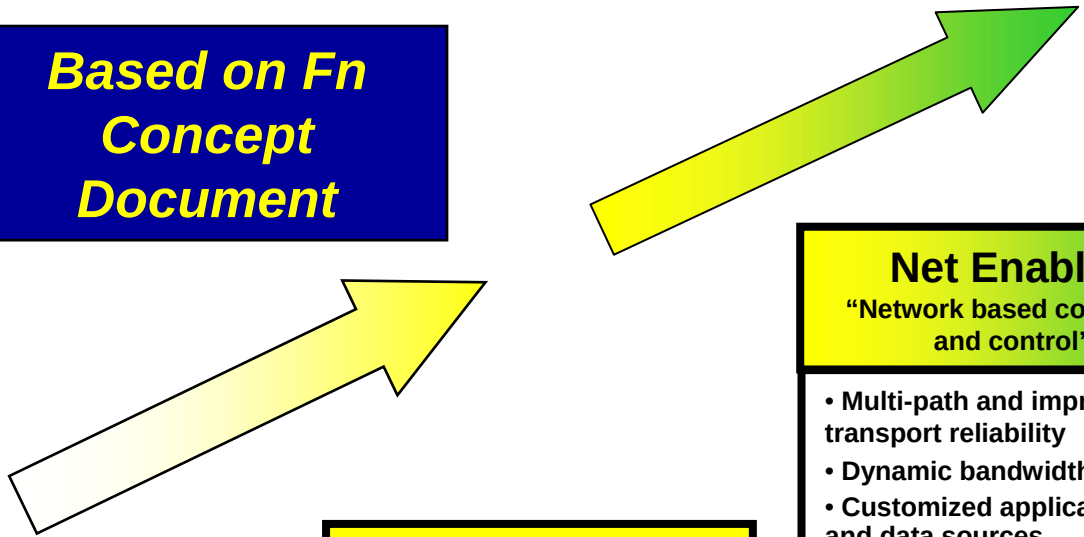


NCW Ready Improvement Opportunities



Capability Stepping Stones to Fn

Based on Fn Concept Document



Full IT21
"Online"

- IP Reach Back
- Local Area Networks
- Wideband Receive
- RF Management
- Survivable comms

Level 0

Today

Net Connected
"Improved decision making"

- Web-based services
- Improved network reliability and performance
- Increased bandwidth
- Improved coalition operations and data sharing
- Tailorable situational awareness tools
- Standardized data exchange between domains
- Defense in depth

Level 1

FY07

Net Enabled
"Network based command and control"

- Multi-path and improved transport reliability
- Dynamic bandwidth mgmt
- Customized applications and data sources
- Common infrastructure and data exchange standards
- Improved data exchange across domains
- Enterprise management for asset analysis and repair
- Initial knowledge management and automated decision aids
- Assured sharing
- Distributed command and control operations
- Modular and open architecture

Level 2

FY10

Fully Net Ready
"Decision-making under undesirable conditions"

- Robust, reliable communication to all nodes
- Reliable, accurate and timely information on friendly, environmental, neutral and hostile units
- Storage and retrieval of authoritative data sources
- Robust knowledge management capability with direct access ability to raw data
- User-defined and shareable SA
- Distributed and collaborative command and control
- Automated decision aids to enhance decision making
- Information assurance
- Seamless cross-domain access and data exchange.
- Interoperability across all domains and agencies
- Autonomous and disconnected operations
- Automatic and adaptive diagnostic and repair
- Modular architecture to expedite new capabilities

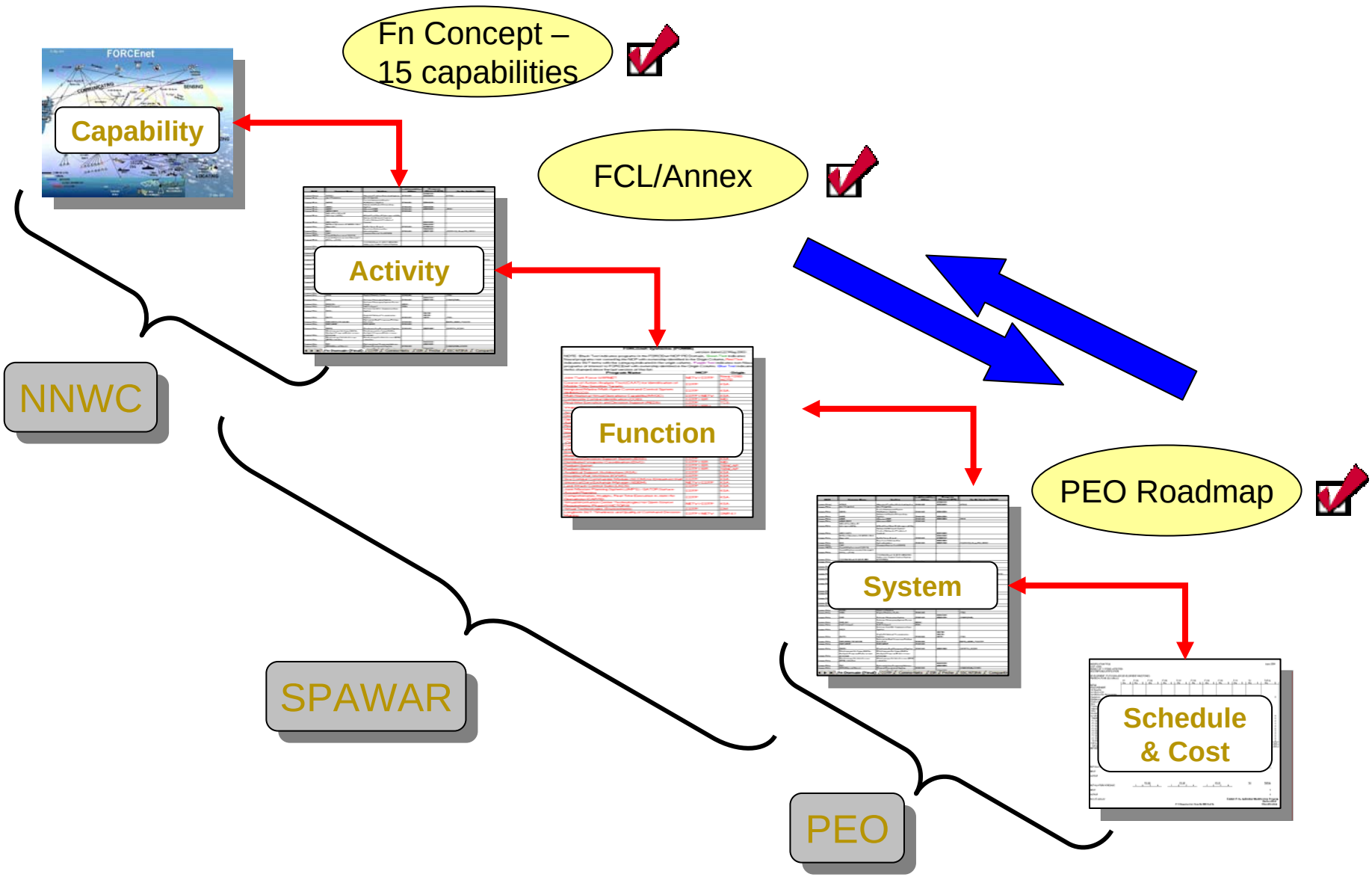
Level 3

FY14

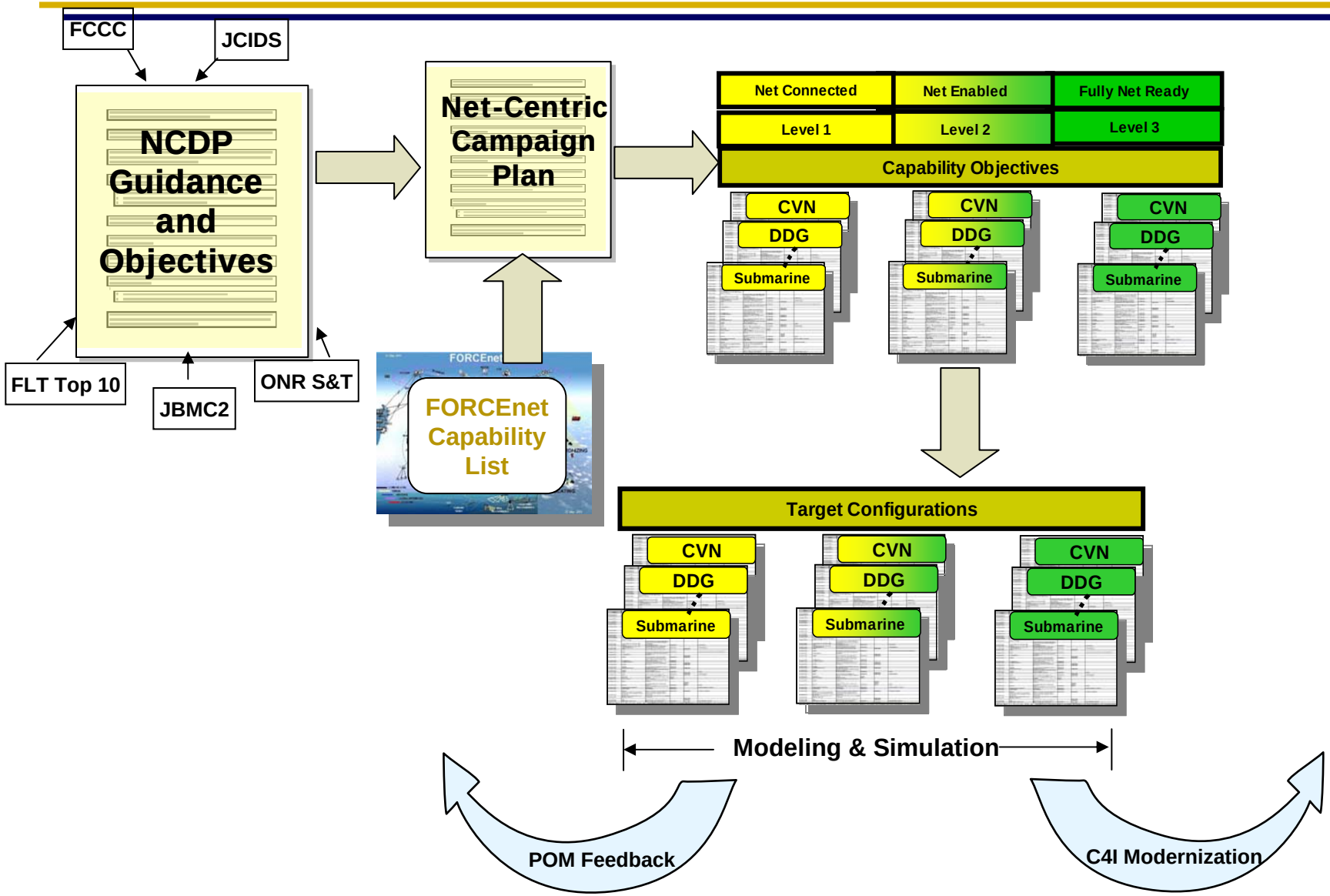
NCW Level Components

	Platform	Level 0 Basic Network Connection	Level 1 Higher Bandwidth & Improved Network Infrastructure	Level 2 NCW Enabled	Level 3 Fully NCW Ready
Bandwidth Enabled	Ships Subs Shore	IP capable, Link 11, Link 16, MIDS-LVT (LOS Only), DWTS, CWSP, EHF MDR, DSCS, INE	INMARSAT upgrades (2X BW), GBS IP migration, EHF TIP, X/C-Band for DDGs, ADNS Incr 2 (IP Static QoS Mechanism, Traffic Mgmt Mechanism & Application Prioritization, WGS BW Bottleneck), ISNS Incr 1 (Traffic Shaping/IP compression), Link 22, Dynamic Data Link Network Management, CSRR, Sub HDR antenna, High Speed Global Ring (HSGR), SSGN, VA SHF, Sub cutover to IP, BLOS Tactical Data Exchange, VoIP Incr 1, HAIPE	IPv6, NMT (4X Protected BW (2 Mbps)), WGS w/ EBEM modem (10X BW (15 Mbps)), MUOS (64 Kbps to small term), JTRS, WNW, Tactical Networking Waveform, Video over IP, CDL Spiral 1, Sub COMMS at Speed/Depth, Sub SHF (FOT, Sub X-Band Turbocodic modem), WGS Ka, ADNS Incr 3 (Black Core Routing), Satellite Dynamic Bandwidth Allocation, Sub HDR antenna, VoIP Incr 2	TSAT w/ TC terminal (17-45 Mbps protected), Advanced HDR antenna, TCDL/Ku-band in the OE-538, VoIP Incr 3, IXS Cutover/Assured IP
	Aircraft	Legacy, MIDS-LVT (LOS Only), Link 11	Link 16, Link 22	MIDS JTR, WNW (TTNT-Like), Tactical Networking Waveform, Weapons Data Link	TSAT w/ TC terminal (17-45 Mbps protected), IXS Cutover
Services Oriented Architecture	Ships Subs Shore	Sharing of data via translators (Link 16 data to CCS via translators), IP Capable via LAN, Link 11, MIDS-LVT (LOS Only) Link 16 data integrated into Combat (exception of 10 CVs, CGs), Serial Crypto, INE, CENTRIXS, GPS Receivers(NAVSSI)	GCCS 4x (web enabled services). ISNS Incr 1 (ruggedized redundant network, GIG-E), SSEE incr E, NGC2P, Link 22, COMPOSE 2&3, Sub-LAN (Incr 1&2), CDL-N, SCI Networks incr 2, Enterprise Management Spiral 1, CENTRIXS BLK 2, CND Phase 3, EKMS Phase V, BLOS Tactical Data Exchange, Port DMS to ISNS/Sub LAN, GPS User Equipment Upgrade (NAVSSI, NAVWAR), HAIPE	IPv6, NCES Incr 2 (Common Enterprise Infrastructure, Open Services/Interfaces, Web-Enabled), DCGS/TCS, WNW uses CLIP for Combat interface, COMPOSE 4, CDL Spiral 1, CLIP, JTRS, WNW, Tactical Networking Waveform, SSEE incr F, JICO Support System , Enterprise Management Spiral 2, Content Based Encryption, GPS Modernized User Equipment, ISNS Incr 2	CDS (Content Based INFOSEC), Merged Networks, NCES (Incr 3), IP based combat systems (DDX, CVN 21), Assured IP, Sub-LAN Incr 3, Enterprise Management Spiral 3, SCI Networks incr 3
	Aircraft	Some aircraft with Link 16 MIDS-LVT (LOS Only), Link 11, GPS Receivers	Link 16, Link 16 data integrated into OFP, Link 22, GPS User Equipment Upgrade (NAVWAR)	CLIP, MIDS JTR, WNW (TTNT), Tactical Networking Waveform, Stand Alone Display uses IP data (Kneeboard IP capability via WNW pipe), WNW uses CLIP for host interface to OFP, Weapons Data Link, GPS Modernized User Equipment	CDS (Content Based INFOSEC), OFP uses IP based information, Modify OFP to handle IP based traffic
User Centric Information Systems	Ships Subs Shore	Sharing of data via translators, CDF/BGPHES/COBLU	GCCS 4x/JC2 Incr 1 (Web Enabled Devices, User Defined Operational Picture (UDOP)), COMPOSE 2&3, SSEE incr E, CUB (SCI GCCS), METOC Upgrades, NTCSS, Optimized Organizational Maintenance Activity (OOMA), TMIP-M, Navy Enterprise ERP Convergence Effort, CBR Dispersion, JWARN,	IPv6, JC2 Incr 2 (Common Enterprise Infrastructure, Applications Migrate to NCES), CLIP, COMPOSE 4, DCGS/TCS, SSEE incr F, JICO Support System	JC2 Incr 3 (DOD wide use of Services Oriented Architecture), CDS (Content Based INFOSEC)
	Aircraft				JC2 Incr 3 (Modified OFP to handle IP based Information)

Capabilities-to-Systems Mapping



NCW Roadmap – Next Steps



Technical Alignment

- Modeling & Simulation
  - Collaborating with SPAWAR 05 to establish NCW Level models for NCDP analysis
- FORCEnet Consolidated Compliance Checklist (FCCC)
  - NESI identified as a Fn Compliance criterion
  - PEO C4I teaming with Fn CHENG to evolve NESI compliance tools
- S&T Roadmap
  - Targeting alignment with ONR Roadmap efforts
- Open Architecture
  - Implemented through NESI Guidance

Summary

- NCW Roadmap is a key component of C4I advanced planning
  - Links Resource, Requirements, S&T, Acquisition and M&S communities

- NCW Campaign Plan is a OPNAV, NNWC, PEO C4I effort to transform the NCW Roadmap concept into actionable information